TARGET AUDIENCE: Engineering Flight, Maintenance Engineers

AFCESA A-GRAM

AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

99-06 **JANUARY 1999**

"SLOW FILL" COMPRESSED NATURAL GAS FUELING

SYNOPSIS:
To satisfy the Energy Policy Act of 1992, the Air Force is buying light duty vehicles which burn compressed natural gas (CNG), an alternate fuel. CNG is a high-pressure version of the fuel used to heat homes and cook food. There are many installations where the consumption of CNG is too low to justify a conventional fast fill fueling station. An alternative is the Vehicle Refueling Appliance (VRA) or "Slow Fill" station.

WHAT IS A VRA?:
A VRA is a compact device, about the size of a window air conditioner, which compresses low-pressure gas for use in CNG Vehicles. A standard unit produces about one gasoline gallon equivalent (gge) per hour or about 10 to 12 gge overnight. Larger capacity units are available. Up to four vehicles can be filled from one appliance simultaneously. Multiple VRAs can be used to fuel a fleet of CNG vehicles.

DISCUSSION:
VRAs are simple to operate. At the end of the workday, you plug the refueling hose into the vehicle tank, push the start button, and leave. The next morning, the vehicle is fueled and ready to go. The appliance shuts off automatically when the tank is full. Because compression occurs slowly and at night when temperatures are cooler, the tank is completely filled. (Note: Fueling can be done at any time when the vehicle is idle.) Frequently, fast fill stations fill only to 85 percent capacity. Because most vehicles will not require fueling each day, one appliance hose can serve multiple vehicles depending on type of vehicle and driving experience. Four to six small vehicles can be serviced by one VRA. That means 10 VRAs may be able to handle between 40 and 50 vehicles. The beauty of this system is that you never go to a fueling station again. A drawback is that fuel delivery to specific vehicles is impractical to measure, although delivery to VRAs can be measured for reimbursement purposes.

WHERE DO I PUT VRAs?:
Locate VRAs near a natural gas line. VRAs come with up to 2 hoses per appliance, or, with an auxiliary panel, up to 4 hoses. One configuration made up of 4 appliances in a cabinet connects to remote panels for fueling 8 or more vehicles per night at a total rate of 4.9 gge per hour. Limited fast fill capability is available for urgent needs. Each user can have a dedicated VRA(s) if the supplying gas system will support it.

SAFETY:
VRAs have diagnostics to detect leaks and automatically shut down. If someone forgets to detach the hose, it automatically disconnects and the equipment shuts down. Units are less noisy than a window air conditioner. Installation must follow NFPA 52, CNG Vehicular Fuel Systems, NFPA 54, National Gas Code and NFPA 70, National Electric Code.

COST:
Cost varies with capacities and options chosen but is about half that of a fast fill station. A one gge/hr unit costs less than $10,000 installed. With multiple units, the price drops. Leases are available. A simple compressor module changeout is required every 3,000 hours of operation. Labor saved by not driving to the fuel station accelerates payback.

WHERE TO BUY:
Currently only FuelMaker Inc. manufactures VRAs for the CONUS, although competition is expected within CY99. Call (800) 898-FUEL for the name of their local distributor. FuelMaker Inc. plans to be GSA-listed in the near future. See www.fuelmaker.com for more information.

CONTACT:
Mr. Alvin L. Day
HQ AFCESA/CESM
139 Barnes Drive Suite 1
Tyndall AFB FL 32403-5319
DSN 523-6357
Comm: (850)283-6357
Email: daya@afcesa.af.mil